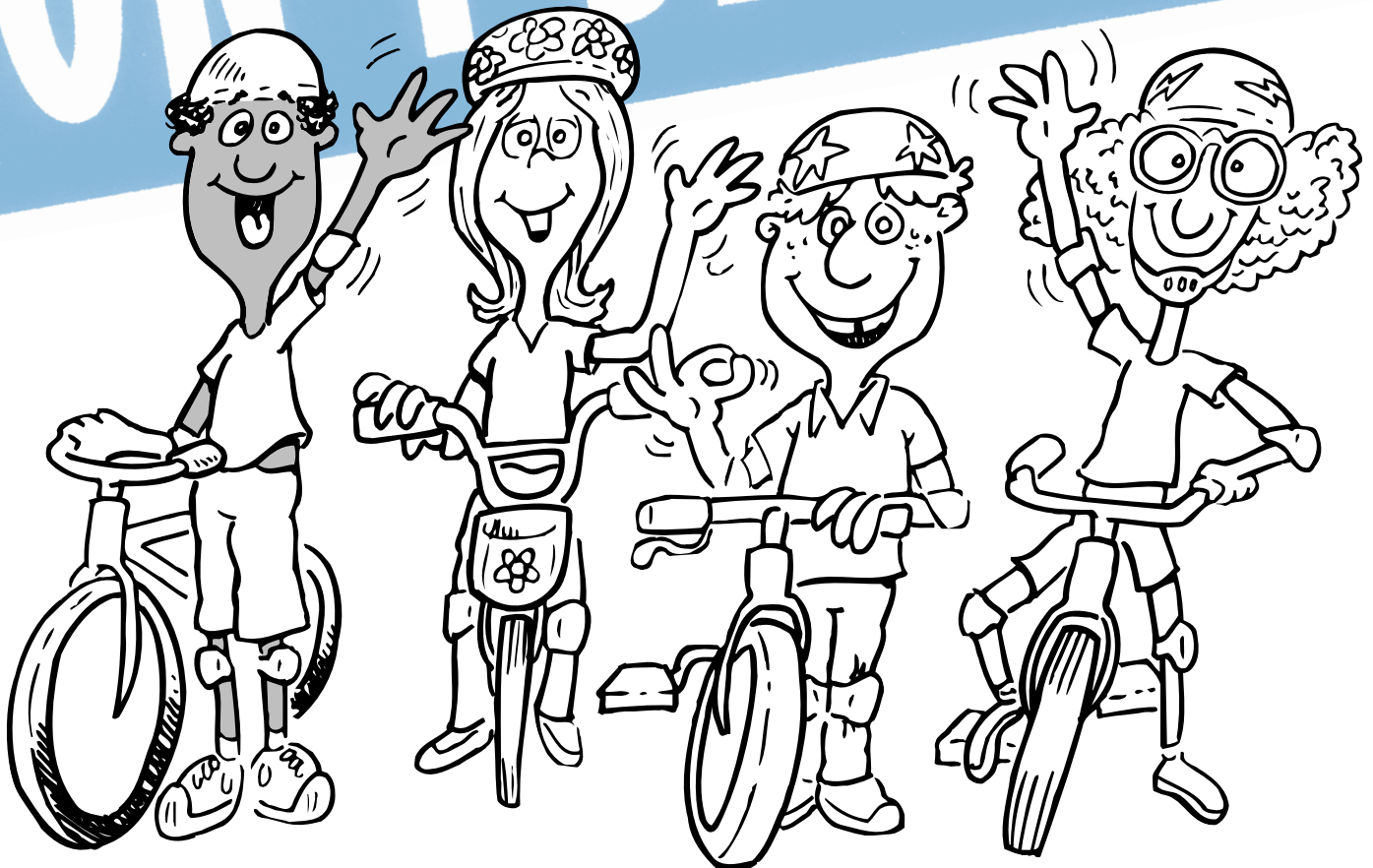


"Don't Spoil It"

Activity Book

From the KDHE



KANSAS DON'T SPOIL IT!

STATE OF KANSAS

BILL GRAVES, Governor
State Capitol, 2nd Floor
Topeka, Kansas 66612-1590



(785) 296-3232
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OFFICE OF THE GOVERNOR

Dear Kansas Educator,

Each spring, communities throughout Kansas join in nationwide activities designed to increase our awareness and understanding of environmental issues. These activities center around "Earth Day" which will fall on April 22nd in 1999. To help our schools participate in this springtime event, the Department of Health and Environment has prepared this guidebook which contains many educational and fun activities for you to implement in your school.

The guidebook identifies the week of April 19-23, 1999 as "Kansas Don't Spoil It" Week. "Kansas Don't Spoil It" is the same theme which I unveiled about two years ago at the State Fair to encourage our citizens to appreciate and care for our environment. This guidebook is just one of many public education and awareness initiatives which has utilized the theme.

This guidebook provides you as an educator with a quality tool to involve your students in hands-on experiences designed to teach life-long behaviors which will help keep Kansas clean and beautiful for generations to come. The activities are designed specially for Kansas and our environmental conditions. Although I encourage use of this guidebook during "Kansas Don't Spoil It" Week, it can be used at any time to teach basic environmental protection principles.

Please let us know whether you used this guidebook in your school by notifying KDHE. Also, we would welcome any input you could provide to help us improve the guidebook for future years.

Finally, I want to thank you for participating in "Kansas Don't Spoil It" Week. All of Kansas will benefit from the lessons you teach your students both today and in the years to come.

Sincerely,

A handwritten signature in black ink, appearing to read "Bill Graves".

BILL GRAVES
Governor

ACKNOWLEDGMENT

The Kansas Department of Health and Environment would like to acknowledge the support of Kansas Farm Bureau in making this activity book available to all public and private elementary schools in the state.



OVERVIEW OF "DON'T SPOIL IT!" PROGRAM

"Kansas: Don't Spoil It!" is a statewide public awareness program sponsored by the Kansas Department of Health and Environment. The purpose of the KDHE program is to encourage environmental awareness and resource conservation. Funded by a portion of the tipping fees paid by all contributors to any publicly accessible landfill, the program's goal is to keep Kansas clean by encouraging positive public habits and attitudes where environmental issues are concerned.

Colorful posters have already been distributed to Kansas schools as part of the KDHE's public awareness initiative. Billboards have gone up throughout the state. The underlying message is the same. We know Kansas is a beautiful state and we want to do our part to keep it that way. **"Don't Spoil It!"**



YOUR FEEDBACK IS IMPORTANT!

If you found this activity guide to be helpful and you choose to use one or more activities with your class please let us know by mailing or faxing the form below to KDHE.

Your comments are always welcome. If you have suggestions or feedback on the contents of this activity guide we would like to hear from you too. Again, the form below can be used for that purpose.
Thanks!

Mail form to:
KDHE - BWM
Forbes Field
Building 740
Topeka, KS 66620-0001

OR

Fax form to:
785/296-8909
(Phone 785-296-1600)

Educator's Name

School

School Address

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Phone Number

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Fax Number

Grade Level

Number of Students in Class

Activities Used

No. of Participants

Feedback and Other Comments

Don't Spoil It! Week: Environmental Education for Kansas Schools

Don't Spoil It! Week is a series of events, activities and curriculum introducing statewide solid waste management issues to children in grades K-6. The week will coincide with Earth Day and Earth Week, the third week of April 1999.

The "Don't Spoil It!" Week program is designed to give children a tangible and practical understanding of resource conservation and the environmental impact of solid waste. Using Lessons in Solid Waste Management, the existing curriculum provided by the KSU Cooperative Extension Service, and other lessons and activities, this program will focus specifically on efforts to reduce, reuse and recycle solid waste, compost biodegradable materials and wisely use and dispose of household hazardous wastes.

Students will also be introduced to solid waste issues facing Kansans. Through a series of projects, students will be encouraged to learn about the management, operation and problems facing landfills; reuse, storage and disposal of old tires; the expense and difficulty of cleaning up illegal dumping sites; and issues involving the state's water quality.

*Make a difference.
Get On The Recycle Cycle!*



Pollution

OBJECTIVE:

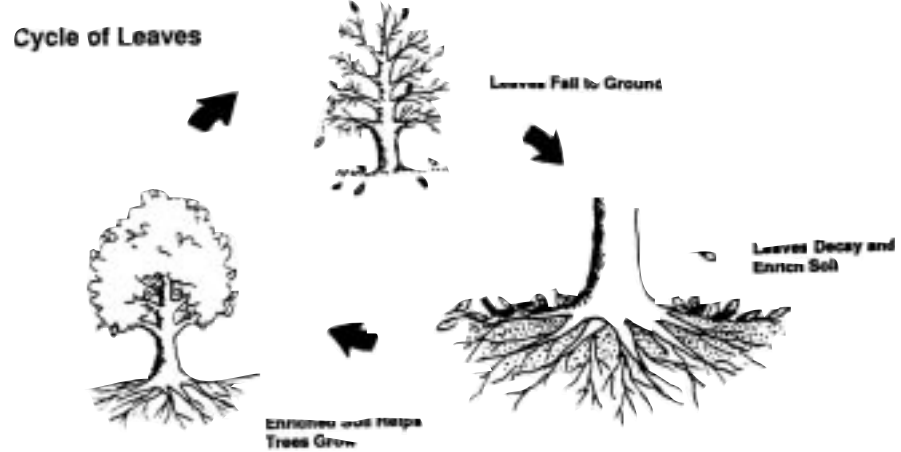
To acquaint students with the concept of pollution and how to diminish it.

VOCABULARY:

pollution
environment
waste
dump
litter
dispose
biodegrade
garbage
landfill
compost
decompose

Discussion: The Problem with Pollution

Ask students to tell you what waste is, and explain why it can be good or bad. How do we dispose of waste? Point out that all living creatures produce waste in some form, but nature has devised ways of dealing with it, from the rotting of manure and dead plant material to the decaying of carcasses. Other plants and animals help the process, as does light, heat, water, wind and cold. The process is called decomposition (or biodegrading).



Humans are more wasteful creatures compared to other earth dwellers. While we have been smart enough to slow or prevent biodegradation of important elements in our environment, our clever engineering also has resulted in a tremendous amount of waste that is difficult to biodegrade. When waste ends up where it is undesirable it becomes pollution.

What problems are created when manmade items are slow to biodegrade?

Discussion: Tons of Waste

The average Kansan discards about 4.5 pounds of waste a day. Statewide, that's a total of 4,950 tons of waste! Every day! How much waste would one student generate in a year? How much waste would all students in the classroom generate in a month? A year? How about the entire school? The entire town?

Discussion: A Bunch of Garbage

Imagine a bag of trash that has some leftovers in it: rib bones from last Saturday's barbecue; lasagna from Sunday's dinner; shrimp shells from Monday night; leftover beans; cottage cheese that went bad; a wilted head of lettuce; and other food from your cleaning out the refrigerator.

How will water, air and soil be affected if the garbage is left out in a dump, placed in a landfill or separated and composted? Which items can be composted? Which can't?





Discussion: Litter by Litter

When you are handed a sandwich at a restaurant, does it come wrapped in paper, plastic or foam? How long does it remain in that wrapper? How long will the wrapper take to biodegrade and where does it go?

You can clean up the environment and have a nice afternoon outdoors with your classmates, too! Organize a litter cleanup at a community park or recreation area. Discuss ways to encourage people not to litter. Take pictures of unsightly litter in the community and create a bulletin board display labeling the photos with captions describing where the pictures were taken and what, if any, steps are being taken to alleviate the litter problem. You might even take your display to a city hall meeting or community action group to bring greater awareness to the issue.

Questions:

- What is litter?
- What is the most common type?
- Where is litter most common? Why?
- How could littering be reduced or stopped?
- What are the positives and negatives of the following methods of eliminating litter?
 - Tossing the wrapper into the trash?
 - Tossing it outside the car as you drive down the street?
 - Asking the restaurant not to wrap the sandwich, but to give it to you on a cloth napkin or washable plate? Which strategy is easier for you? Which is easier for the restaurant?
 - Changing the packaging?
 - Returnable containers redeemable for a deposit?
- Any additional ideas for eliminating litter?

Discussion: Landfills and Dumps

When you pack your daily 4.5 pounds of waste in a trash bag, how much have you placed at the curb at the end of the week? What types of trash create a lot of volume? Where does it go? Imagine you are that bag of trash and explain what happens to you if:

- You are taken to a landfill.
- You are illegally dumped in a ravine or at a dead-end road.

What would the removal of aluminum, steel, glass, plastic and paper have on the waste stream? What will happen to the rest of the trash? What types of trash take a long time to biodegrade? What happens to Styrofoam that is in your trash?

At an illegal dump, litter and waste are accessible to rats and insects. What health problems can this cause? Using your senses (seeing, hearing, feeling and smelling), how would you detect pollution at an open dump?



REDUCE

OBJECTIVE:

Introduce the concept of reducing waste as the first effective strategy to controlling pollution of the environment.

VOCABULARY:

ecological
wasteful
natural
reusable
convenience
recyclable
packaging
simple
waste stream

Less is best, at least when it comes to waste. Although businesses can help reduce solid waste, individuals have the greatest impact through the decisions they make every day. Your students can make a difference in the reduction of solid waste.

Close examination of everything around us helps us find ways to reduce the stream of solid waste we generate. Recycling of materials is good — making decisions not to use materials is even better.

Exercise: Packaging Roundup

The objective here is to explore options for reducing packaging. During "Don't Spoil It!" Week, send students on a survey of their local supermarket (or an imaginary supermarket in your own classroom) looking for examples of the following three types of packaging:

- 1 Natural packages (oranges, nuts, apples, bananas, tomatoes)
- 2 Older and reusable packages (paper bags, paper wrapping, glass jars, returnable bottles)
- 3 Modern packages (plastic, polystyrene, aluminum foil, individual wrappings)

Ask students to list five examples each from categories one and two; and ten examples from category three. Compile their findings and make a combined list for the entire class.

Questions:

- What purpose does the packaging serve for each of the items on the list?
- How dependent is the product on the package?
- How could each package be used or recycled?
- What alternate packaging could be used that is more environmentally sound?

Discussion points:

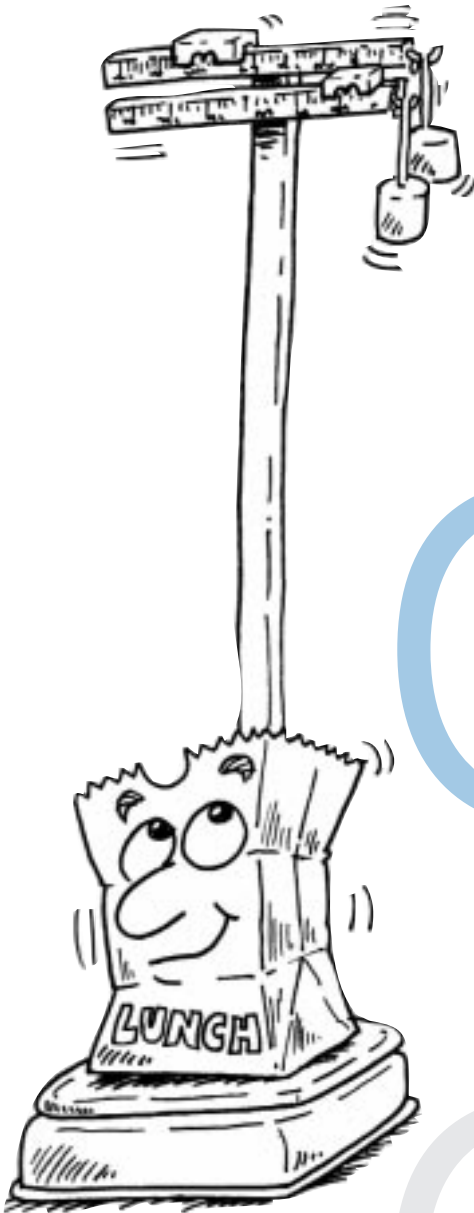
- Decide which packages create excessive waste and which minimize waste.
- Have students distinguish between products that must be packaged the way they are and ones that could use less packaging.
- Talk about what students can do to promote the use of less packaging, from reusing shopping bags to buying products in bulk quantities.
- Be sure students justify answers.



Exercise: Environmental Lunches

Have students bring "environmental lunches" to school. Weigh all the lunches before eating, then weigh all remaining materials that cannot be reused, recycled or composted. See if students can reduce the net weight of their lunch waste each day of "Don't Spoil It!" Week.

Discuss the fact that just because things can be reused, recycled or composted does not mean it is being done. Consider possible reasons why these items may still be thrown in the trash.



Discussion: Imagine Reduction

Ask students to develop a list of everything they throw away in a week's time. Compare lists and discuss. What would they do if they were not allowed to throw out anything in a garbage can at home or at school. Ask them to compose a list of ways to minimize garbage.

Exercise: Waste Audit

Conduct a week-long "waste audit" at your school, listing the amount of food and paper waste. The cafeteria supervisor can provide information on food waste; the custodian can help your students understand the volume of paper waste.

Questions:

- What can be recycled?
- What poses a health hazard?
- Which waste takes up more volume?
- How can reducing waste in your school be accomplished?

Discussion: Longer Use

Proper maintenance, use and planning allow materials to be used more before they no longer serve their purpose. Find out how long your books, desks, school building or pencils are lasting by determining when they first went into use.

Questions:

- How long do cars, tires, furniture, clothing and appliances last?
- What maintenance or use habits can make them last longer?

REUSE

OBJECTIVE:

Teach students to reuse wherever possible as a strategy for waste reduction.

VOCABULARY:

disposable
durable
recyclable
rechargeable
necessity
reusable
lend
borrow
share
convenience

Reuse is another way to slow the stream of waste. By reusing a product or packaging more than once — and finding innovative ways to extend the life of those products — we help conserve resources and diminish waste.

Exercise: Use-it-again Box

Introduce students to the concept of reuse as an alternative to disposal. Ask children how many uses they can think of for a large peanut butter jar or a coffee can. Write them on the board. Tell children that many things can be used again, or reused in the same or in different ways.

Set up a “use-it-again” box for your classroom. Have the students paint, color or paste pictures on it. Suggest that students place in it all materials that can be used again. Encourage students to make contributions to the use-it-again box on each day of “Don't Spoil It!” Week.

Exercise: Designed for Reuse


Some products are purposely designed for disposal, particularly when public health is a factor. Toilet and facial tissue, paper cups and paper towels have replaced reusable alternatives that can spread disease. Sanitary cleansing of many reusable items can be less wasteful, even though they may be less convenient.

Gather objects or pictures of objects that are designed to be reused. Those items could include the old style pop and milk bottles, cloth grocery bags, canning jars, cloth napkins, dinnerware, sponges, refillable pens, cloth diapers, rechargeable batteries and ceramic or glass cups. For each item, make a list of non-reusable alternatives, and write the recyclable alternatives in green, the non-recyclable alternatives in red.

Examples:

- Glass drink bottles were designed to be reusable. Plastic and paper milk containers aren't designed to be reusable, but they are recyclable.
- Cloth napkins are designed to be reusable. Paper napkins aren't reusable or recyclable.
- Cloth grocery bags are designed to be reusable. Plastic and paper grocery bags are reusable, but only to a very limited extent. They are recyclable.
- Glass canning jars are designed to be reusable. Most glass jars and plastic jars aren't designed to be reused, but can be recycled.
- Rechargeable batteries are designed to be reusable. Other batteries are neither reusable nor recyclable.
- Cloth diapers are designed to be reusable. Disposable diapers are neither reusable nor recyclable.





Questions:

- Are recyclable products reusable or disposable?
- Are recyclable products disposable?
- Is there a price premium?
- Who gets to reap the benefits of the consumer?

- Talk about the choice that they made or recyclable
- Discuss the why they made that item at other

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Ask students to bring to class examples of products they consider durable and those they consider disposable. Lead a discussion determining whether the products are durable or disposable.

Questions:

- Are some things, like electronic devices, disposable or durable?
- What about shoes? Clothes?
- Does it depend on whether it is easier or less expensive to fix them than to replace them?
- What role does the speed of improving technology play in the durability and disposability of some items?

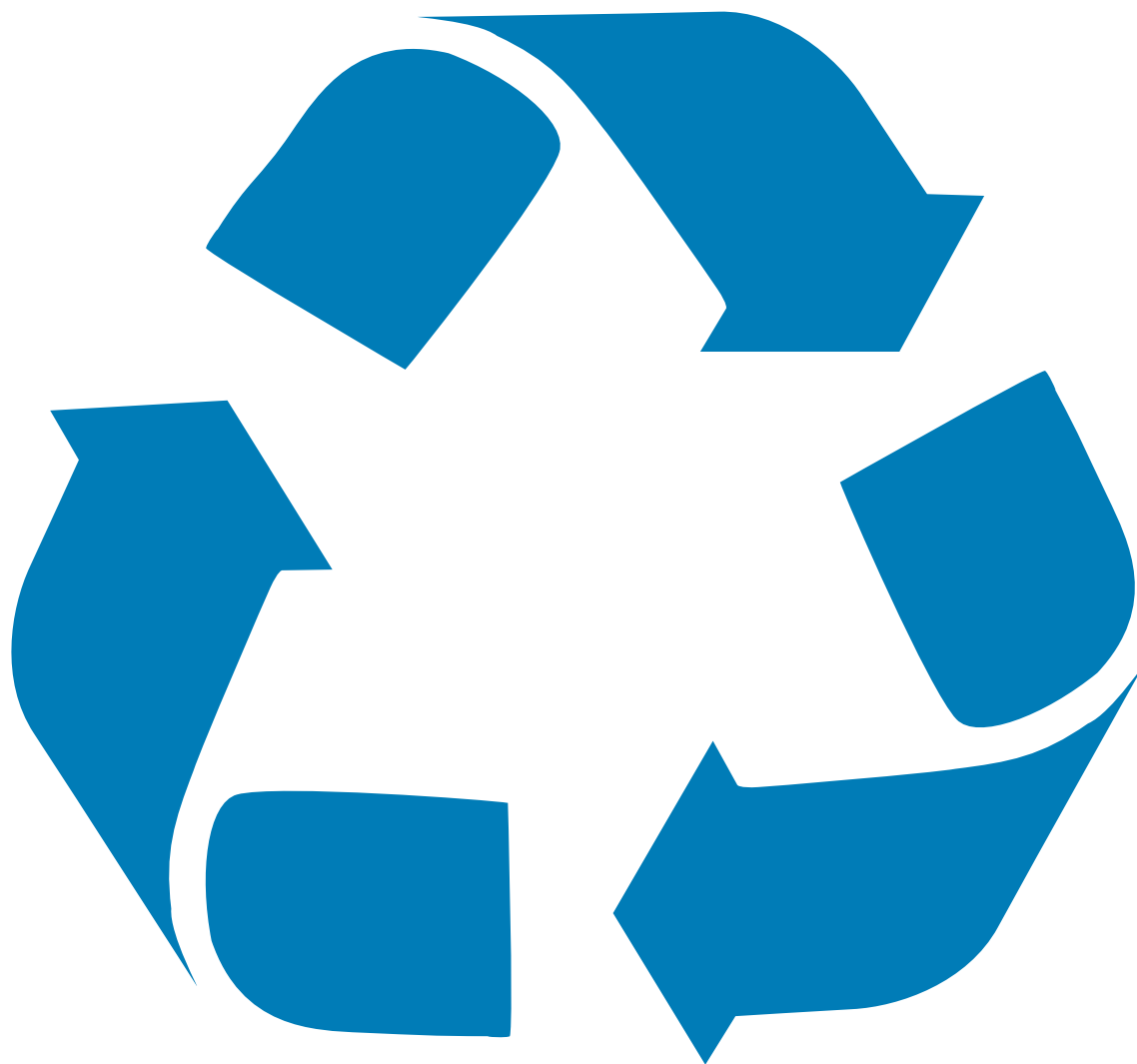
- Ask students to consider that you have the same musical recording on a 45- or 33-rpm record, an eight-track tape cartridge, a cassette tape and a compact disc. To hear the music, you must choose the player. Discuss how advances in technology render products obsolete, even though they may still function perfectly designed.
- Ask students to name other products that have become obsolete because of changes in technology, and what products are in a transition stage of obsolescence.



OTHER ACTIVITIES:

- Ask students why teachers use a blackboard and chalk instead of large pieces of paper and big markers to write out lessons for the entire class. Which is more reusable? Why? For history integration, have students research the use of blackboards/chalk and the natural resources used.
- When something isn't reusable, what are the costs? Consider the materials, disposal, storage, handling or other expenses. Discuss the costs associated with reusables and recyclables. How do costs compare? (Recyclable glass is heavier than recyclable plastic and costs more to transport.)





RECYCLE

OBJECTIVE:

To acquaint students with the concept of recycling as a key strategy in protecting the environment and get them involved in recycling efforts.

VOCABULARY:

recyclable
aluminum
manmade
reprocessing
reform
ore
efficient

Recycling uses the same materials over and over again to form new products. There are three stages of recycling: collecting, processing and reusing. Point out to students that when something is recycled, it is not added to the waste stream but completes the circle as something new. Just as leaves go back into the soil to help a new tree grow, manmade objects can be broken down and used to make new objects by reprocessing the usable material. Identify five types of materials that can easily be recycled.

Exercise: Tour a Recycling Facility

To get an idea of how much waste can be recycled, contact a recycling plant in your community and ask to schedule a tour. Newspaper and aluminum recycling plants may be close to your school.

Ideally, your students can collect recyclables before visiting the center. You should have a separate clearly labeled box for each type of recyclable collected (aluminum, white paper, newsprint, plastic bottles, glass, etc.) Stress to students the importance of separating their waste for recycling.

Exercise: Do the Can-Can

Organize an aluminum can collection drive in your school. Weigh the cans for each class and award first, second and third prizes for the most cans collected. (A local recycling center is a good place to have the cans weighed.) Show that aluminum has value by following and recording the market price for aluminum. Discuss the reasons behind the fluctuating price.

Exercise: School Recycling Program

Have students in your class start a school recycling program. They could begin by setting up collection boxes for used writing paper in all the classrooms. A collection drive for certain recyclables, such as aluminum, could be used as a fund-raiser. You might organize a competition between grades for the most recyclables collected. (Be sure you have suitable markets for your recyclables before you begin a collection program.)



Exercise: Partners in Recycling

Have students in your classroom become a partner with a local business or organization to recycle their cans, paper or other items that can be kept out of the waste stream. Report to the business on how much was recycled.

Activity: Aluminum can roundup/rodeo

Organize contests that are fun and teach the spirit of recycling aluminum cans.



- ***Tee up or tee off*** — accuracy in batting an aluminum can from a tee-ball stand into a recycling bin earns points. Materials needed include a tee-ball stand, a bat that can withstand possible marring (an aluminum bat would be appropriate) and a bin large enough to accept batted cans. Or, draw a circle on the ground for cans to be hit into.
- ***Can crusher contest*** — winners (either groups or individuals) are determined by who can fit the most crushed cans into the same size recycling bin. Start with un-crushed cans and get your stomping shoes ready. (Make sure students wear closed shoes with sturdy soles. No sandals!)
- ***Aluminum can relay*** — Divide into two teams with equal numbers. Players use a new, unopened aluminum can of carbonated soft drink. The participants must run an obstacle course, trail or track holding the can, passing the can to another team member after each lap is completed. At the end, both cans are opened and the team with the can that retains the greatest amount of carbonated beverage wins.

Exercise: Play On Recycling

Divide your students into three or four groups and have them write and perform a play that focuses on a recycle theme.

Examples:

- The main character could be a can that began as bauxite ore in the hills of North Dakota and was processed into an aluminum can, and at each step along the way was a friend that helped recycle the can to another use.
- Many characters representing an aluminum can, a steel can, a newspaper, a plastic jug, a glass bottle and motor oil find their ways around the marketplace, avoiding the landfill or the illegal dump through recycling to new uses.



Discussion: Recyclables

- **Newspapers** — Recycling one ton of paper saves 17 trees. Can old newspaper become new newspaper, cardboard or insulation? (Yes, *through shredding, treatment and reprocessing*.) Can old newspaper become steel for cars or aluminum for soft drink cans? (No, recycling cannot change elemental properties, only shapes, conditions and uses of materials.)
- **Aluminum** — Making aluminum products from recycled aluminum instead of from bauxite ore uses 95 percent less energy. How are old aluminum cans recycled as new aluminum cans, foil, airplane or car parts, siding for houses or other uses? (Aluminum scrap is collected and compressed for transport to a recycling foundry where high-temperature ovens melt it down into ingots, which are then sold to reprocessors. The ingots may again be melted to form a variety of aluminum products. The aluminum metal's properties are controlled by adding other metals, making the finished products harder, like engine parts, or softer and more flexible, like aluminum foil.)
- **Steel** — Iron ore must be mined, transported, extracted and refined with carbon to make raw steel. What household materials made of steel can be collected, recycled and the metal reformed into car parts, girders for buildings, reinforcing bars for bridges, sidewalks, roads and buildings? (Cans, buckets, chair and window frames, pipes, registers and reinforcing bars are household materials made of steel that can be recycled.)

- **Glass** — Glass bottles can be melted down and recycled, too. What can that glass be reformed to create? (New bottles, jugs and jars, windows.) How is fiberglass made? (Glass is melted down to a liquid form and “spun” into fine filaments or strands as thin and as flexible as hair. Plastic resin is then poured over the glass fiber and together the two materials can be formed to virtually any shape while providing unusual strength compared to the light weight.)
- **Motor oil** — Used motor oil and transmission fluid will pollute water and streams if not recycled. How can it be recycled into new oil and grease? (Used oil can be reheated and refined to produce good lubricant oil again.) Are there other uses for waste oil? (Waste oil can be burned in special incinerators to produce extremely high temperatures with very little pollution. It is a valuable fuel for certain industries requiring intense heat, such as concrete manufacturing.)
- **Old tires** — How can old tires be recycled? (Old tires can be reused as playground equipment, shredded and incorporated into paving materials or as fuel in high-temperature furnaces.)



COMPOSTING

OBJECTIVE:

To teach students that the natural process of recycling occurs every day through composting of biodegradable materials and introduce the principles of composting.

VOCABULARY:

compost
organic
non-organic
decay
biodegrade
fungi
bacteria

Recycling is a natural process, constantly carried out everywhere on the planet through the interaction of plants, animals, sunlight, water, wind, heat and cold. Ask students to give examples of nature's cycles. Explain to them that composting is a natural recycling process by which plant material is returned to the soil, as it is in the nutrient cycle. The composting process enriches and improves the consistency of the soil while reducing the amount of solid waste requiring disposal.

Exercise: Build A Bin

Here's a good project for you and your students to get started prior to "Don't Spoil It!" Week. Build a simple compost bin using 10 feet of 4-foot-wide wire mesh formed into a cylinder. Place leaves, grass clippings or straw up to six inches on the bottom, then add uncooked food waste, garden refuse, dung or manure covered by more leaves, grass or straw. Cover every two or three layers with a few inches of soil and moisten with water. Turn the pile occasionally to circulate air and distribute the moisture. Monitor the changes in the compost.

Questions:

- Why does the material in the compost bin generate heat?
- Does that heat have a purpose?
- Is there a noticeable reduction in mass or physical volume of material?
- Has the compost changed color?
- Does it give off an odor?

Exercise: Organic Garden

Start a school garden in early March using compost to enrich the soil. Plant two rows of radishes and two rows of lettuce in soil not enriched with compost, and two rows of radishes and lettuce in the compost-amended soil. By "Don't Spoil It!" Week, which vegetable plants look healthier? Encourage students to determine differences in weight, size, etc. Invite in a Master Gardener to share organic gardening techniques.



Exercise: Organic Decay

Your students will enjoy this exercise, but you'll have to get started early. In the fall or winter collect several types of organic materials in milk jugs with the tops cut off and small holes punched in the bottom for drainage. Leave the jugs with their materials outside exposed to sunlight, rain and temperature changes. Measure, weigh and take the internal temperature of each container's contents at the beginning of the experiment, then take the same measurements weekly until "Don't Spoil It!" Week. Keep a log of the findings.

Questions:

- Which materials decay the fastest?
- How long does the complete decay process take?

Field Trip: Deep in the Woods

Take a field trip to a wooded area to show children what ultimately happens to leaves and other organic materials. Use a small rake or garden claw to dig around beneath different kinds of trees. Do pine and other conifers also create their own mulch like the leaves of deciduous trees? What about weeds and grass? Do they create their own compost, too?



OTHER ACTIVITIES:

Kitchen composting

Encourage students to place a plastic bucket under their kitchen sink at home where uncooked vegetable waste can be temporarily stored before being composted. Better yet, get a local store to donate plastic buckets for your students to decorate and make their own kitchen compost buckets.

Worms at work

Cut the top off a gallon plastic milk jug, punch a few small holes in the bottom for drainage and drop in dirt, grass clippings and several earth worms. Spray on some water to keep it moist. Do the earth worms speed the compost process?

HOUSEHOLD HAZARDOUS WASTE

OBJECTIVE:

To help students identify household hazardous wastes, teach them to identify those substances and explain why they are dangerous to the environment.

VOCABULARY:

toxic
non-toxic
hazardous
cleansers
green products

Discussion: Dangers at Home

Household hazardous wastes are products we use everyday in the home, yet some of them may be harmful to our health or to the environment. Ask students to identify products at their house that are dangerous, hazardous or toxic. Discuss with students the problems of disposing of these household hazardous wastes. Explain that by throwing them out we poison our environment, even when they go to a landfill or incinerator.

Exercise: Understanding Toxicity

You might want to introduce this activity by asking children to have their parents help them find five things around the house that could be harmful to the earth. Stress that young children should not handle these items. Begin a discussion by talking about what students found.

Questions:

- Have you ever seen products with a label that says “warning,” “danger,” or “caution”? What does this mean? What kinds of products have these labels? (ammonia, turpentine, bug spray, drain cleaner, nail polish remover)
- What does the label usually warn you against doing? (swallowing, getting it in your eyes, maybe getting it on your skin) Why?

Explain to students that substances that contain ingredients that may be poisonous are called toxic. Encourage students to consider where waste from toxic products might end up and why it might cause problems to people or to the environment. Explain that many of these toxic substances can be replaced by non-toxic or less toxic products that do the same job.

Ask students if any have seen boxes of baking soda in refrigerators or sachets of herbs in closets or drawers. Explain that these are non-toxic substitutes for air fresheners that may contain toxic ingredients.

Let students know that some products, such as household batteries, also contain ingredients that become harmful only after they are thrown out and may leak into the environment.





You may want to conduct the following demonstrations for non-toxic substitutes for the class:

- **Tarnish remover** — Boil 3 inches of water in a shallow pan with 1 teaspoon of salt, 1 teaspoon of baking soda and a sheet of aluminum foil. Submerge a tarnished piece of silverware in the solution and boil for three minutes. Use a cloth to wipe away the tarnish. Repeat the process if the tarnish remains. All ingredients used are non-toxic. Is commercial silver polish also non-toxic?
- **Window cleaner** — Use a vinegar and water solution and a cotton cloth to clean windows. Is the solution as effective as a commercial window cleaner? Is the commercial window cleaner toxic or non-toxic? What natural ingredients are now included in window cleaners?

Exercise: Hazardous Impact

Demonstrate how household hazardous waste can affect all living things by cutting the top off a clear plastic soft drink bottle, filling it with silica sand, pouring in a cup of water and then pouring a cup of used motor oil on top.

Discussion:

- Ask your students whether they would drink the water at the bottom of the sand if it had been filtered through the sand that held the motor oil.
- Ask them how much oil — a lot or a little — would contaminate underground water.

OTHER ACTIVITIES:

- Give students a list of various household materials and label those that would qualify as household hazardous waste. Which materials are more dangerous and why?
- Have students develop a list of hazardous household waste materials. Have them interview parents to see if parents know where to dispose of the materials on the list.

KANSAS ISSUES

OBJECTIVE:

To familiarize students with the specific environmental issues facing Kansas and how the state is dealing with them.

VOCABULARY:

landfill
cleanup
illegal dump
leachate
runoff
groundwater
methane gas
sewage
fertilizers
nitrates
pesticides
herbicides
insecticides
breeding ground

Discussion: Landfill Logistics

Ask students to locate the nearest landfill in the area. Find out how long it has been operating and what agency of the government is responsible for regulating it. The landfill operator will be able to provide the acreage and daily, weekly or annual volume amounts the landfill accepts and when it is expected to be filled to capacity.

Questions:

- What sorts of waste cannot be taken to the landfill? Why not?
- How is a landfill designed so the refuse buried there doesn't contaminate surface water, ground water, air or surrounding soil?
- What are appropriate sites for a landfill?
- What happens when a landfill is full?
- What kind of care does a closed landfill require?
(Answers include maintenance of the final cover; ground water monitoring, methane gas monitoring, etc.)
- How are landfills closed? Discuss what the land above a landfill site can be used for after one is closed.

Exercise: Build a Mini Landfill

Have children construct both a mini-landfill and a mini-dump and compare the two over the course of several weeks. You may wish to have each child construct a mini-landfill, but make only one mini-dump for the entire class.

To build the mini-landfills, have children cut three-quarters of the way around the top of a one-gallon plastic milk or water jug. Have them place a layer of soil on the bottom, then alternate layers of soil and garbage, leaving a layer of soil at the top. The garbage should include a variety of organic and inorganic items: a metal barrette or paper clip, a piece of plastic, a piece of aluminum foil, a piece of newspaper, a candy or gum wrapper, a piece of food (apple, orange skin). Sprinkle with water, seal the openings with masking or duct tape and cover with the lid. Open the lid to air and water the landfill approximately every other day.

For the dump, fill a second plastic jug with soil and place the garbage on top. Sprinkle the dump periodically with water and leave it uncovered.

Have children list all of the items they have placed into their dumps and landfills and keep separate charts monitoring the changes in both. At the end of the observation period, discuss with children the differences between what happened in the dump and in the landfill.

In the dump, over a period of time you can expect the food to rot and smell slightly. The newspaper will also begin to break down. (You may wish to explain the process of decomposition to children.) Paper wrappers will decompose as well, but plastic will not. The metal barrette will gradually rust and nothing will happen to the plastic or aluminum foil. Very little decomposition should take place in the landfill and it should not smell.

Questions:

- What types of problems might result from disposing of garbage in an open dump? (*Answers might include odors, attract rats or other pests; disease; ugly; trash could spread to other areas and pollute them; run out of space to put more garbage.*)

Point out to children that, in the past, dumps did not protect the surrounding environment from the trash dumped in them. Landfills present better ways of disposing of our garbage. Liners in modern sanitary landfills prevent waste from polluting or contaminating the groundwater under them. Deposited waste is covered daily with soil for added protection. Modern landfills also control any liquid, or leachate, that accumulates in the buried waste so that it does not leak into the environment.

Many environmental problems associated with dumps have been eliminated with sanitary landfills, which will continue to be the major form of disposal for many years to come. They should also realize that little decomposition occurs in this type of landfill.



Exercise: Litter Details

Discuss ways to encourage people not to litter. If cameras are available for student use, encourage students to take pictures of unsightly litter in their community. Create a bulletin board display, labeling the photos with captions describing where the pictures were taken and what, if any, steps are taken to alleviate the litter problem. Such a display might even be used at a town meeting or by a community action group.

Questions:

- What is litter? Name some types of litter found on the way to school.
- What is the most common type?
- Who are the worst litterbugs?
- What are the social and environmental costs of litter?
- How could littering be reduced or stopped?



Exercise: Open Burning

Conduct this experiment outside and discuss safety issues prior to starting. Punch a metal can with air holes around the bottom. Loosely place in it small pieces of waste food, (an apple core, an egg shell, a slice of carrot, etc.) aluminum foil, plastic wrap, glass and newspaper. In a safe place outdoors, light a match to the contents. Have the children describe what happens.

Questions:

- Which items burn, which don't?
- Which items melt?
- When we burn garbage, where does the smoke go? Is this air pollution?
- What can happen to us when too much smoke gets in the air?
- What happens to the ash produced?
- Is the heat given off usable? For what?

Explain that waste can be burned safely in a properly designed and used waste combustor, which greatly reduces the pollution entering the air. The ash produced must still be disposed of in a specially constructed sanitary landfill.

Explain that the heat produced by combustors also can be harnessed to drive steam generators, which can produce electrical power or heat homes.

Exercise: Old Tires Pose Hazards

On average, vehicle tires last about three years before being discarded and replaced with new tires. That results in a continuing disposal and storage problem that creates fire and health hazards.

Have your students place an old tire outside their school building and leave it untouched for a few weeks. Then, as a class, examine what's inside the tire. Has rain collected inside the tire? Take a sample of the water inside the tire and, using a microscope, look for mosquito larvae. Rainwater inside a tire, warmed by the sun is considered a highly effective mosquito breeding environment. A single tire examined in Ohio was found to contain 5,000 tree hole mosquitoes, which spread deadly encephalitis and dengue fever.

Questions:

- How has the tire become a breeding ground for mosquitoes?
- Why is it disposed tires might pose a public health hazard?
- What happens when tires burn?
- What are the best methods of eliminating old tires?
- Suggest (or research) possible uses for old tires.

Exercise: Counting Up the Tires

Get your calculators ready! There are currently more than 2.2 million licensed vehicles in Kansas, with the following breakdown:

- 2.1 million cars and trucks
- 96,000 trailers
- 48,000 motorcycles

Cars have four tires, trucks anywhere from four to eight or 10 tires, motorcycles two tires and trailers, well, some have two tires, many over-the-road trailers have 10 tires. Multiply the number of cars and trucks by five, the number of trailers by eight and the number of motorcycles by two, add them together and divide by three to get a rough idea of the number of used tires discarded in Kansas each year.

Questions:

- How big of a disposal problem does this create?
- Do tires biodegrade? What can be done to recycle or reuse the tires?
- How does the proliferation of tires create a space problem?

Discussion: Illegal Dumping

Roadsides, creek beds, washed out culverts and gullies are infamous as sites for illegal dumping. In parts of Kansas, these unsightly dumping sites are a stain on our state's great beauty. Discuss this issue with your students.

Questions:

- What are the hazards of illegal dumps?
- Why do people dump illegally?
- What can be done to make some sites less attractive for illegal dumping?
- What does it take to clean up illegal dumps?
- Is it more difficult to clean up illegal dumping than to provide a legal site to dispose of waste?

Discussion: Water Quality

Many Kansans get their drinking water from lakes, rivers and streams. In western Kansas, many communities and farmsteads draw their water from deep wells. Others, particularly on farms in eastern Kansas, draw their water from shallow wells.

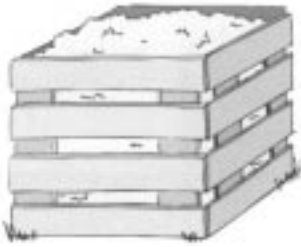


Questions:

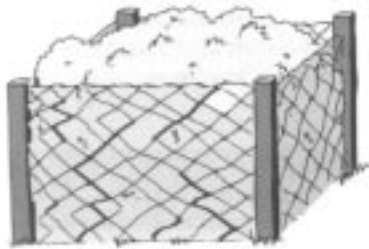
- What are some of the threats that can pollute these water sources?
- Does animal waste pose a threat?
- Does human waste (sewage) pose a threat?
- What are threats to water sources in suburban and urban areas?
- Are road salts used to clear snow and ice from roads a threat to our drinking water?
- How do lawn and crop fertilizers, herbicides and pesticides threaten water sources?
- How can chemicals applied on fields hundreds of miles away affect drinking water downstream?
- How does the cycle of evaporation and condensation help to clean water in our lakes and streams?
- Take a field trip to your local municipal or area water treatment plant and find out the source of your community's water. What is the process for cleaning the water? What chemicals are added?



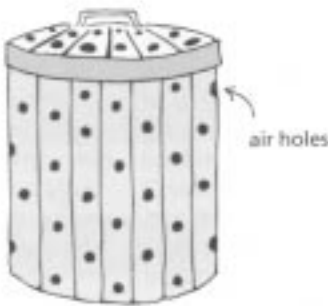
Composting Components



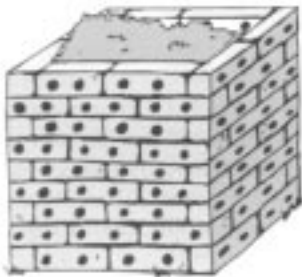
wooden pallets or
pressure-treated lumber



chicken wire and wooden posts



trash can
(30-45 gallon size)



brick or cement blocks
with holes



wooden slats

Micro-organisms — These are the biological engines that drive the breakdown of organic matter placed in the compost. Micro-organisms are found in the soil.

Organic Material — Food scraps, yard clippings, leaves and other organic material serve as the fuel for microorganisms. Compost materials must be a combination of carbon sources (“brown” materials such as dry leaves, twigs and sawdust) and nitrogen-rich sources (“green” materials grass clippings, vegetables and fruit materials). Use more “brown” than “green” in your compost pile, as much as 25 to 40 times more. The size of the organic material can greatly affect the rate of decomposition. Smaller particle size allows for more rapid breakdown.

Aeration — The microorganisms that help cause decomposition are mostly aerobic bacteria that need oxygen to function and survive. Make sure your compost container allows for adequate ventilation. Mix the pile regularly to speed up the composting process.

Moisture — Compost piles need water, but not too much or too little. The compost pile should be as moist as a wrung-out sponge.

Temperature — Compost piles produce heat. An actively decomposing pile will be hot enough to burn your hand — 130-160 degrees Fahrenheit in the middle. As the decomposition of materials is completed, the temperature of the pile goes down.

Time — Composting is a gradual process. Depending on your compost pile, the process takes several days to several weeks. Aerating the pile helps speed up decomposition.

Worms — Worms help to aerate the pile and break it down. The worms break down the waste and leave droppings that enrich the soil. (Red worms can be used for indoor composting.)

GLOSSARY



- **Aluminum** — lightweight metal derived from bauxite ore.
- **Bacteria** — single-celled micro-organisms that live in soil, water, organic matter or the bodies of plants and animals.
- **Biodegrade** — capable of being broken down into innocuous products by the action of living things, especially micro-organisms.
- **Borrow** — to briefly acquire with the intention of returning, such as tools or other useful objects.
- **Breeding Ground** — a place or circumstances suitable for growth and development.
- **Cleansers** — preparations of often harmful chemicals used for cleaning.
- **Compost** — the decomposed organic material resulting from the composting process and used to enrich or improve consistency of soil for growing.
- **Convenience** — designed for quick and easy use.
- **Decay** — aerobic decomposition of proteins chiefly by bacteria.
- **Disposable** — designed to be thrown away after a single use or limited period of time.
- **Dispose** — throw away without reuse.
- **Dump** — a site or place where unwanted materials are discarded.
- **Durable** — capable of withstanding long use, wear and decay.
- **Ecology** — a branch of science concerned with the interrelationships of organisms and their environments.
- **Efficient** — productive without waste of materials, expense or energy.
- **Environment** — the complex physical, chemical and biotic factors (climate, soil and living things) that act upon an organism or ecological community and ultimately determine its form and survival.
- **Fertilizer** — a substance (chemicals or manure) used to enrich soil and promote plant growth.
- **Fungi** — a major branch of organisms that absorb their nutrients from dead or living organisms. Mushrooms, yeasts, toadstools, rusts, molds and mildews are all fungi.

- **Garbage** — originally, spoiled or waste food that was thrown out; now, any material considered worthless, unnecessary or offensive and usually discarded.
- **Green Products** — non-toxic goods made with little energy and few natural resources designed to be reused, recycled or quickly biodegradable.
- **Groundwater** — water within the earth that supplies wells and springs.
- **Hazardous** — flammable, corrosive, reactive or poisonous wastes that pose a danger to the health of organisms.
- **Herbicides** — chemicals specifically manufactured to kill plants.
- **Insecticides** — chemicals specifically manufactured to kill insects.
- **Landfill** — a location used to dispose of solid waste.
- **Leachate** — liquid that has percolated through solid waste and/or has been generated by solid waste decomposition, and that has dissolved or suspended materials in it. The liquid may contaminate ground or surface water.
- **Lend** — to offer the temporary use of an item or resource with the intent of receiving it back.
- **Litter** — waste materials carelessly discarded in an inappropriate place.
- **Man-made** — processed through human design.
- **Methane Gas** — a colorless, odorless flammable gaseous hydrocarbon that is a product of decomposition of organic matter.
- **Natural** — occurring commonly in nature without human action or encouragement.
- **Nitrates** — sodium or potassium nitrate, chemicals commonly used in agricultural fertilizer.
- **Ore** — metal-bearing mineral.
- **Organic** — made or grown without using manufactured chemicals, stimulants, antibiotics or fertilizers.
- **Packaging** — a container or wrapping made out of any of a number of materials and used for storing, transporting or displaying a product.
- **Pesticides** — chemicals specifically manufactured to kill animals, including insects, spiders, birds, amphibians, fish and mammals.



- **Pollution** — the contamination of soil, water or air by the discharge of potentially harmful substances.
- **Rechargeable** — batteries that can be repeatedly charged.
- **Recyclable** — material that still has useful physical or chemical properties after serving its original purpose and that can be reused or remanufactured into additional products.
- **Reprocess** — to treat for reuse.
- **Reusable** — made to be used repeatedly.
- **Runoff** — water or other fluid that is not absorbed by the soil and so enters streams and other bodies of water.
- **Sewage** — liquid organic waste, particularly human waste.
- **Share** — to use with others.
- **Toxic** — producing or containing a poisonous substance that is harmful or deadly.
- **Waste** — material that has been discarded because it has worn beyond usage, no longer needed or undesirable.
- **Waste Stream** — the flow of waste.



Web Sites and Phone Numbers for Recycling, Composting and Environmental Education Information

Aluminum	www.aluminum.org
Glass	
Glass Packaging Institute	www.gpi.org
Paper	www.pulpandpaper.net
Rethink paper	www.earthisland.org/paper/rtp.html
Corrugated Packaging Council	www.corrugated.org
Plastics	www.plasticsresource.com
	www.plasticsmall.com
Plastic container recycling	www.napcor.com
Steel	www.steel.org
	www.recycle-steel.org
Composting Sites	
Cornell Composting	www.oldgrowth.org/compost
	www.cfe.cornell.edu/wmi/
Composting News	www.recycle.cc/
Environmental Education Sites	www.eduzone.com
Green Teacher	www.web.net/~greentea/
Environmental Education (US)	eelink.net
Stan Slaughter	www.stanslaughter.com/
Recycling Sites	
Old newspaper to new	www.ozemail.com.au/~paper
Environmental/Recycling Hotline	www.1800cleanup.org
Environmental Defense Fund	www.edf.org
America Recycles Day	www.AmericaRecyclesDay.org/
Global Recycling Network	grn.com/index.html
Can Manufacturing	www.cancentral.com
Internet Recycling Guide	www.obviously.com/recycle//recycle/
Recycle City	www.epa.gov/recyclecity/

Solid Waste Sites

Environmental Industry Assn www.envasns.org
Solid Waste Association of N. Am. www.swana.org

Solid Waste Tour

www2.plasticresource.com/bocs/apc/tour/homepagelhtmlhome.htm

EPA

www.epa.gov

Waste Age

www.wasteage.com/

Source Reduction/Waste Minimization Sites:

Use less stuff/NSTA Curricula www.cygnus-group.com
Enviro\$en\$e www.inel.gov
Direct Marketing Association www.the-dma.org

Kansas Environmental Information Resources:

Kansas Department of Health and Environment
Bureau of Waste Management

785-296-1600
800-282-9790

Kansas Assn. for Conservation and Environmental Education (KACEE)*
785-532-3314

Kansas Business and Industry Recycling Program, Inc. (BIRP)*
785-273-6808

Kansas Farm Bureau 785-587-6000

K-State Research and Extension 785-532-1441

Environmental Defense Fund 1-800-CALL-EDF

Environmental Recycling Hotline 1-800-CLEANUP (253-2687)

U.S. Environmental Protection Agency Solid Waste Hotline
1-800-424-9346 (For publications press 1)

Your local county extension agent

* Environmental curriculum available



KANSAS

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